GE Transportation

Tempo* Interlocking Solution

Flexible and modular computer-based interlocking for mainline and mass transit applications

GE imagination at work

Tempo Railway and Urban Transit Solutions

Supported by more than 100 years of technological innovation

For more than a century, GE Transportation has been solving the world's toughest rail challenges with innovative products and advanced rail technologies that have changed the industry. Today these breakthroughs continue with the Tempo Interlocking Solution. This next-generation signaling solution blends GE Transportation's technical leadership and expertise in controlling life-cycle cost, increasing deployment flexibility and improving environmental performance.

Tempo Interlocking Solution

Evolution rather than revolution

Tempo computer-based Interlocking Solution is suitable for small or large lines—from fewer than 20 track objects up to 1,000 track objects per controller—and supports both centralized and distributed architectures. Leveraging the same Vital Platform as the other Tempo subsystems, Tempo Interlocking comprises a core set of standardized hardware and software components enriched with customized project-specific components. This concept reduces deployment time, allows greater system flexibility with minimum complexity, fewer obsolescence cycles to maintain and fewer costs associated with replacing single components. Its extreme scalability allows phased deployment, upgrades and extensions with minimal revenue service and cost impact.

For maximum flexibility and adaptability to all types of operational requirements, the Tempo Interlocking solution interfaces to trackside objects via Input/Output Controllers (IOCs), which can be remote from, or co-located with, the central interlocking controller. This scalable and adaptive architecture helps meet installation constraints and required performance, while decreasing costs by reducing lengths of costly cables to track circuits, axle counters, switch machines and signals.

Tempo Interlocking has been designed with operational availability and maintainability in mind. Its platform provides a failsafe solution compliant with CENELEC SIL4 standards and supports 2oo2/2oo3 architectures. Formal verification methods can be used to prove safety properties. Its independent duplicated IP-based networks covering the entire line and hot standby feature improve the overall system availability and maintainability, preventing downtime.

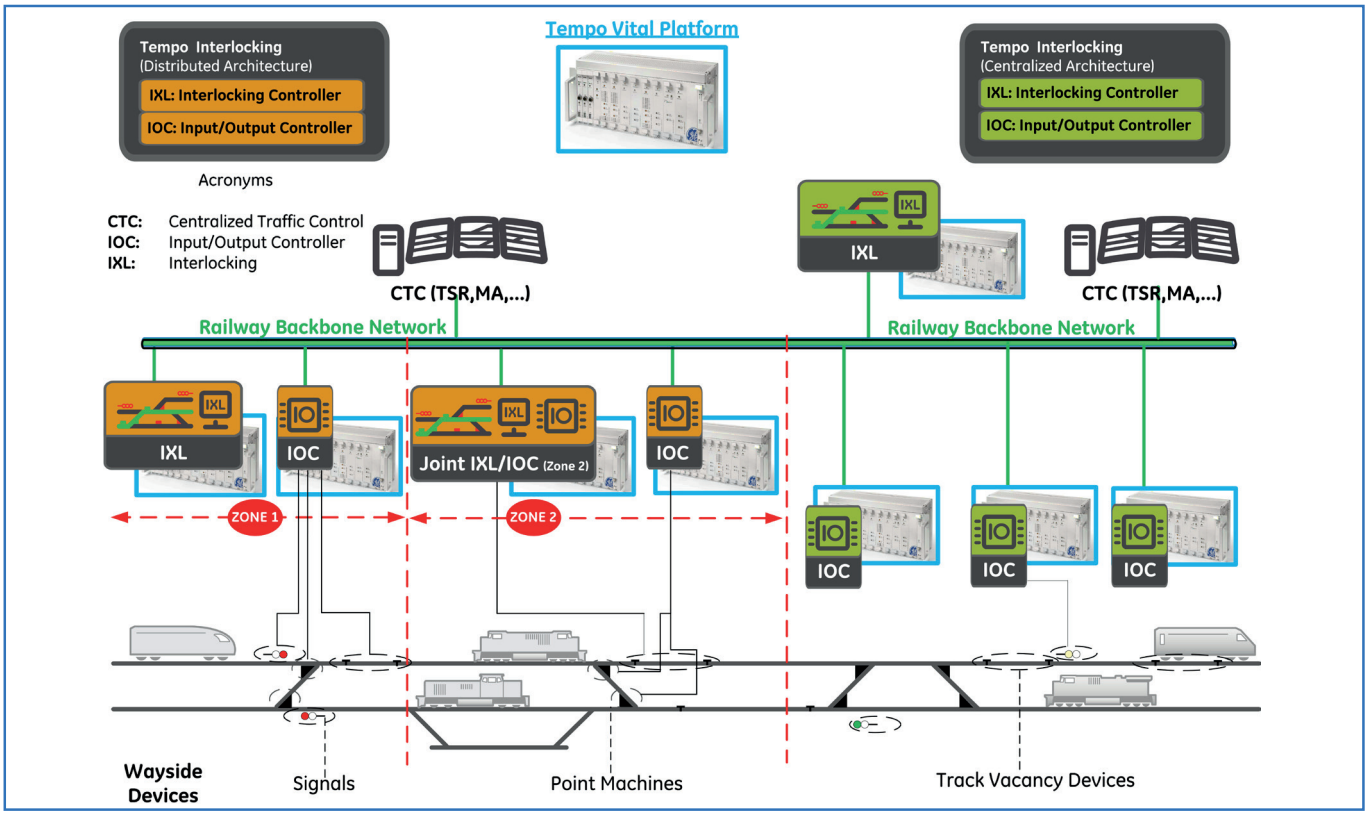
Tempo Interlocking – Key Features

Key Features	Benefits
• Centralized or distributed architectures • Standard IP-based networking for local and wide area networks	• Scalability to support small and large stations • Installation cost reduction • Adaptive architecture to best meet installation constraints and required performance
• Relay-based or direct drive interfaces • Interfaces easy to customize for specific wayside objects and communication protocols	• Maximum reuse of existing wayside equipment
• Redundant input/output (IO) boards for critical interfaces • Embedded health monitoring of wayside equipment through direct drive interface	• Improved availability
• Object-oriented application design (model-based)	• Easy evolution of line configuration and signaling principles during life cycle
• Can be networked with other cabinets through the communications network	• Increased I/O capacity

Tempo Vital Platform

Key Features	Benefits
Tempo Vital Platform can host either: • Interlocking (IXL) Controllers • Distributed Input/Output Controllers (IOCs)	• Optimized spare parts management • Controlled obsolescence • Reduced inventory, training and maintenance • Enhanced scalability over the system life cycle
• Supports 2oo2/2oo3/2x2oo2 architectures • Hot-swappable and pluggable boards • RFID tagging, advanced diagnostic capabilities at board level	• Greater system availability • Real-time remote and local system monitoring • Condition-based maintenance • Enhanced asset management capability

Tempo Interlocking Architecture



Tempo Interlocking Cabinet - Technical Data

Dimensions		Height	Width	Depth	Contents
	Cabinet	2078 mm 81.81 in (with cable socket)	600 mm 23.6 in	880 mm 34.64 in	Contains up to 5 racks (1 vital core rack and 4 slave racks)
	Racks	222.25 mm (5U) 8.75 in	482.6 mm 19 in	150 mm 5.9 in	Contains the 2oo2/2oo3 vital core
	Boards (single Eurocard)	160 mm 6.29 in	4, 5 and 7 Horizontal Pitch Units (TE) respectively	100 mm 3.93 in	Up to 40 I/O peripheral boards
	Switch Module Power Supply (SMPS)	88.9 mm (2U) 3.5 in	482.6 mm 19 in	300 mm 11.8 in	1 per rack 5 per cabinet (Redundant)

	Structural Properties	Metric	Imperial
	Weight	300 kg	661 pounds
	Maximum floor load	500 kg/m2	367 pounds/2foot
	Environmental protection	IP65	IP65
	EMC shielding	80 dB at 100 MHz 40 dB at 1 GHz	80 dB at 100 MHz 40 dB at 1 GHz
	EMC standards applied	EN 50121 and EN 50125	EN 50121 and EN 50125
	Moisture resistance	pH 4	pH 4
	Relative humidity range	5% at 0°C 95% at 55°C	5% at 32°F 95% at 131°F
	Climatic group	TX	TX
	Storage temperature range	-55°C to +85°C	-131°F to +185°F
	Operating temperature range	-40°C to +70°C	-40°F to +158°F
	Operating temperature variance	1°C/minute	1.8°F/minute

	Electrical Properties	
	Power supply range	90 V AC to 270 V AC
	Power supply frequency range	47 to 63 Hz

About GE Transportation

Established more than 100 years ago, GE Transportation, a unit of General Electric Company (NYSE: GE), is a global technology leader and supplier to the railroad, marine, drilling, mining and wind power industries. GE Transportation provides freight and passenger locomotives, signaling and communications systems, information technology solutions, marine engines, motorized drive systems for mining trucks and drills, high-quality replacement parts and value-added services.
GE Transportation employs approximately 12,000 employees worldwide.

Regione Toscana

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GE imagination at work

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